1-1-1955

Test 542: Oliver Super 77

The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: May 18 to May 24, 1955
Manufacturer: THE OLIVER CORPORATION,
CHARLES CITY, IOWA
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 542

OLIVER SUPER 77 HC

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hour	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TEST B—100% MAXIMUM LOAD—TWO HOURS								
43.98	1600	4.060	10.83	0.559	0.00	188	73	28.851
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR								
41.48	1600	3.553	11.67	0.518	0.00	184	68	28.850
TEST D—RATED LOAD—ONE HOUR								
39.30	1600	3.480	11.29	0.536	0.00	182	71	28.848
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
39.35	1602	3.485	11.29	0.536	...	182	70	.....
1.51	1719	1.299	1.16	5.205	...	171	70	.....
20.60	1672	2.350	8.77	0.690	...	177	71	.....
40.36	1572	3.480	11.60	0.522	...	185	71	.....
10.47	1697	1.765	5.93	1.020	...	174	71	.....
30.40	1647	2.865	10.61	0.570	...	181	70	.....
23.78	1651	2.540	9.36	0.647	0.00	178	70	28.844
TORQUE (At Dynamometer)								
Eng rpm	1597	1498	1396	1297	1199	1096	997	899	796	704
Lb-ft	256.6	260.6	261.5	263.2	266.5	266.5	266.7	269.9	266.4	261.6
Dyn rpm	836	784	730	679	628	573	522	470	416	369

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TEST H—RATED LOAD—TEN HOURS—4th Gear											
30.24	2006	5.65	1599	4.32	3.088	9.79	0.618	0.00	183	79	28.767
TEST F—100% MAXIMUM LOAD											
37.61	2516	5.61	1602	5.35	4th gear				189	87	28.740
TEST G—OPERATING MAXIMUM LOAD											
30.67	5366	2.14	1603	17.10	1st gear (part throttle)				188	88	28.770
34.89	4253	3.08	1602	9.52	2nd gear				188	86	28.770
35.60	3174	4.21	1603	6.75	3rd gear				182	73	28.660
35.71	2378	5.63	1601	4.80	4th gear				189	82	28.790
35.11	1987	6.63	1601	4.38	5th gear				188	88	28.750
32.69	1039	11.80	1601	2.39	6th gear				188	85	28.750
TEST J—OPERATING MAXIMUM LOAD											
35.65	2405	5.56	1601	6.48	4th gear				183	74	28.710
TEST K—OPERATING MAXIMUM LOAD											
35.35	2514	5.27	1600	8.12	4th gear				173	65	28.720

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	586 lb each	None	None
Added cast iron	1120 lb each	None	None
Rear tires			
No. and size	Two 12-38	Two 12-38	Two 11-38
Ply	6	6	4
Air pressure	20 lb	12 lb	12 lb
Front wheels			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 6.00-16	Two 6.00-16	Two 6.00-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	21 inches	22 inches	20½ inches
Static weight			
Rear end	6934 lb	3522 lb	3440 lb
Front end	1455 lb	1434 lb	1434 lb
Total weight as tested with operator	8564 lb	5131 lb	5049 lb

FUEL, OIL and TIME Gasoline Octane No. ASTM 80.8 Research 85.9 (rating taken from oil company's typical inspection data): **weight per gallon** 6.052 lb **Oil** SAE 10 **to motor** 1.235 gal **drained from motor** 1.168 gal **Total time motor was operated** 47½ hours.

CHASSIS Type Tricycle **Serial No.** 8871-702 **Tread width** rear 60" to 92½" front 8⅛" to 12⅛" **Wheel base** 90¾" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 2½ second 3¼ third 4¼ fourth 5⅜ fifth 6⅞ sixth 11½ reverse 2⅝ and 4½ **Belt pulley** diam 11⅞" face 7¼" **rpm** 992 **Belt speed** 3080 fpm **Clutch** single plate dry disc operated by foot pedal **Seat** pressed steel cushioned by rubber in torsion **Brakes** double disc brakes operated by two foot pedals **Equalized** by connecting bar which serves as master brake pedal **Power take-off** direct drive with independent hand clutch.

ENGINE Make Oliver **Type** 6 cylinder vertical **Serial No.** 957685 **Crankshaft mounted** lengthwise **Head I Compression ratio** 7.00 to 1 **Displacement** 216 cu in **Lubrication** pressure **Bore and stroke** 3½" x 3¾" **Rated rpm** 1600 **Port diameter valves** inlet 1¼" exhaust 1⅛" **Governor** variable speed centrifugal **Carburetor size** 1" **Ignition system** battery **Starting system** 6 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** replaceable waste packed filter **Cooling medium temperature control** thermostat.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J & K were made with an operating setting of the carburetor (selected by the manufacturer) of 93.9% of maximum belt horsepower.

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	40.16	46.18
2. Observed maximum horsepower (tests F and B)	37.61	43.98
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	30.12	39.25

We, the undersigned, certify that this is a true and correct report of official tractor test No. 542.

L. F. LARSEN
Engineer-In-Charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors, which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads, of 20 minutes each: rated load, no load, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.